

PUBLIC HEALTH BURDEN OF TRIHALOMETHANES IN SELECTED EUROPEAN CITIES

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Background and Aims: The selection of water treatment methods may have considerable implications for the microbial and chemical quality and furthermore the safety of tap water consumed by over 500 million people in Europe alone. Disinfection by-products (DBPs), which are formed during disinfection treatment of drinking water, may cause serious adverse health effects when exposed to them. Therefore there is a public health concern on the DBPs in drinking water.

Methods: Disability adjusted life years (DALYs) were calculated for six European cities: Barcelona (Spain), Modena (Italy), Heraklion (Greece), Bradford (United Kingdom), and Kaunas (Lithuania). To estimate the risks of trihalomethanes (THMs) due to tap water consumption via drinking, the risk was calculated for five different exposure scenarios including water filtering and different chlorination doses. Bladder cancer and small for gestational age (SGA) were selected to represent the adverse health outcomes of THMs in drinking water. The exposures from drinking water were calculated with Monte Carlo based modelling software Analytica by using Impact Calculation Tool, which was applied the population structure and growth estimates for each city.

Results: Risk estimates show that highest DALYs of bladder cancer and SGA are in Barcelona and Bradford, where the exposure is also highest. Intermediate exposure with lower DALYs is found in Heraklion and Kaunas, and low exposure with low DALYs in Modena. Filtration of drinking water reduces the exposure and DALY estimates significantly. DALY estimates are strongly dependent on the water treatment type such as chlorine dose during disinfection in water treatment.

Conclusions:

Health risks associated with DBPs in drinking water can be significant public health burden when the exposure levels are high. Even EU's regulatory reference concentration 100 µg/L can result in alarmingly high morbidity and mortality rates, especially when using current THM levels exposure is underestimate of life-time exposures.